An Additional Note on American Arrowheads

As Mr. Evans has commenced his remarks on North American arrowheads with the assertion, "A prevailing type," &c., it naturally leads one to conclude that that form to which he refers is "the" prevailing type. I judge, further, that by "prevailing," he means "predominant," *i.e.*, in excess of other types or shapes of these relics. I do agree with Mr. Evans that it is *one* of the principal forms, but not so far a "prevailing" type as to merit the assertion of Mr. Evans, made *as* that assertion is.

As to the leaf-shaped form, I have but to remark that, in my own collecting experience, the true leaf-shaped, *i.e.*, the rounded-based, straight-sided, acutely-pointed form, such as Mr. Evans's Fig. 282, constitutes about $4\frac{1}{2}$ per cent. of those gathered in my own neighbourhood; and this I know to be the experience of other collectors, in other and distant localities. This, I submit, is sufficient to show that this form is not even "comparatively rare," but may be better described as "not uncommon."

And so far as workmanship is concerned, I have only to say that if narrow, thin barbs, acute points, sharp edges, and smoothness of the broad surfaces of arrowheads, constitute what has been termed "delicacy of workmanship," then the American forms in horn-stone, jasper, chert, quartz, agate, and some finely-grained slates, cannot be excelled by similar relics found elsewhere, or made from other material. This remark I base on the specimens collected by myself here in New Jersey, which State is not the best locality, by any means, for gathering these objects; and I have found that the western, northern, and southern specimens have excelled those I have collected here at home.

From the above paragraph I have purposely omitted the mineral obsidian, because the arrowheads of this material excel all others wheresoever found, and I wish to make good my assertions without the help of Californian specimens.

I take the liberty of referring those persons interested in these matters to a large series of arrowheads collected here in New Jersey, and now in the collection of Sir John Lubbock. If some of these are not equal to *any* English specimens, I must simply "give in." CHAS. C. ABBOTT

Trenton, New Jersey, U.S.A., Oct. 10

Merrifield on the Deviation of the Compass

As a review of my little manual on "Deviation," &c., has appeared in NATURE for October 17th, in which I am accused of having "written with looseness and inaccuracy," perhaps you will kindly allow me a small space to answer my critic. He has selected a most unfortunate example to bear out his assertion; and I contend for the accuracy of my statement. "Vertical iron, at the same place, will produce the same deviation in whatever direction the ship's head may be." Here I do not pretend to say (as my reviewer insinuates), that the whole deviation is the same in every position of the ship's head; but I maintain that that part due to *vertical* iron remains constant for the same place until a change of secular variation becomes cognisable. I am at a loss to discover either looseness, inaccuracy, or substitution of cause for effect in what follows, and I am inclined to think, if any exists, it must be on the part of my reviewer

Again, I am not aware of any "singular statements and conceptions" in the larger work on "Navigation and Nautical Astronomy," which are at variance with the matter contained in the small manual under consideration. Perhaps you will kindly permit my reviewer to mention some.

I grant there may be differences of opinion on the merits of any work (as is fully proved in the present instance); but when public statements are made of "inaccuracies," these should either be substantiated or withdrawn.

JOHN MERRIFIELD

Navigation School, Plymouth, Oct. 19

Earth Currents

It may be interesting to record that during the past few days we have been subject to electric storms, I think I may say unparalleled in their frequency, intensity, and duration. On Oct. 14 a severe one raged from 9.30 A.M. to 1 P.M., and in the evening from 10.20 P.M. to past midnight. On the 15th a still more severe one raged from 9.30 A.M. to 1 P.M., and in the evening from 7 P.M. to 9.5 P.M. On the 17th inst. the currents were very embarrassing from 11.20 A.M. to 12.45 P.M., and from 2.10 to 9.0 P.M.; and on the 18th they were again troublesome.

They differed but little in their character from those usually observed, the currents continually varying in intensity and duration during the periods named. The interruptions to business on the 15th were serious, and many stations could only be communicated with by looping the wires, when more than one existed, into metallic circuits. Circuits running east and west were mostly affected, those running north and south, for instance, between London and Brighton, being but little disturbed. I regret to say that no precise measurements of the strength of these currents have yet reached me.

Southampton, Oct. 21 W. H. PREECE

Aurora Borealis

On Saturday, Oct. 6, I was walking in our large playground with a friend, about 8.40 P.M., when we saw above us a magnificent red "way" whose direction was E.N.E. When we first looked, this broad band was bifurcated towards the E. end, one fork going more to the east, and the other to the north. In a minute or two this bifurcation disappeared, and in three minutes more the whole had disappeared, leaving the sky as before. It could be nothing but an aurora; at any rate, it was not the light of any fire, it was too magnificent, and for the time that it lasted of too great a length. I took no notes at the time, but feel that I have given you a correct account of the phenomenon, as far as it goes.

Christ's Hospital, Oct. 20 F. JEFFREY BELL

Ocean Currents

It is to be regretted that the correspondents of NATURE, who for some weeks past have been writing on the subject of Ocean Currents, should ignore the consideration that it is primarily a question of geographical fact, and that any theory which runs counter to that needs no more elaborate confutation than a bare statement of the fact, supported, if necessary, by authoritative evidence. Thus, then, when we find the effect of the earth's rotation put forward, in the way it has lately been, by Mr. Ferrel and Prof. Everett, it is quite needless to examine the calculations which have been adduced; it is sufficient to say that the conclusions arrived at are contrary to geographical fact; that currents do not by any means universally turn to the right in the northern, or to the left in the southern hemisphere;—to name a few amongst many, the Gulf Stream turning to the left round Cape Hatteras, and again towards the coast of Ireland, Rennell's current, the Agulhas current, the Cape Horn current as it turns south near Chiloe, the current through Behring's Strait, are cases in point, currents turning in a manner exactly opposite to that deduced from the theory.

Similarly, when Dr. Carpenter, whether supported or not by several distinguished phycisists, argues from the effect of great differences of temperature in a small trough, as to the effect of much smaller differences of temperature in the incomparably larger ocean, it is unnecessary to follow him into his reasonings, for the conclusion, as he has lately stated it, that there is "necessarily an upper flow from the equator towards the poles," is geographically false. Over a very great part of the North Atlantic there is no prevailing set at all; in the South Atlantic and in the South Pacific the set has a general though slight tendency towards the north; the East Greenland current, the North African current, the South African current, the Peruvian current, and many others, run strongly towards the equator; there is nothing at all resembling a general "upper flow from the equator towards the poles."

As a question of abstract mathematics, Mr. Ferrel is undoubtedly at liberty to prove that every current in the northern hemisphere turns to the right, as much as he was, a few years ago, to prove that there is no air within some twenty or twenty-five degrees of the poles; and as a point of experimental science, Dr. Carpenter's illustrations are pretty, and can be understood without the authority of the distinguished men whose names he brings forward; though I should be loth to believe that Mr. Hawksley, or any other experienced hydraulic engineer, would agree with his idea that water will always find its own level.

But the application of the mathematical problem or the experimental illustration to the case in point is quite a different thing;

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they lead to conclusions which we know to be geographically false, and we therefore refuse to accept them.

Royal Naval College, Oct. 16 J. K. LAUGHTON

Fossil Oyster

Ostrea callifera from the Hampstead beds is described at page 145, and figured on Plate I., of Forbes's "Tertiary Fluvio-marine Formation of the Isle of Wight." Perhaps this is the one "Inquirer" has found. T. G. B.

THE PENNATULID FROM WASHINGTON TERRITORY

I PRESUME this disputed organism, referred to in two communications in your number for September 26, is specifically identical with a specimen from Frazer River, British Columbia, presented to me in the autumn of last year, for the Museum of the University, by Mr. Selwyn, Director of the Geological Survey of Canada, and which had been obtained by Mr. Richardson, one of his assistant geologists. I at once recognised it as the axis of a Virgularia, or some similar creature; but there being no means of reference here for the West Coast species, I submitted it to Prof. Verrill, of Yale College, who had no doubt as to its nature, but believed it probably to belong to an undescribed species. There being no sufficient materials for its description, Mr. Whiteaves of this city, who undertook the description of the marine animals procured by the Survey in British Columbia, merely noticed it in his report as an undescribed pennatulid. Its characters were stated by him in a paper read before the Natural History Society of Montreal last winter, and printed in abstract at the time. Mr. Richardson, who returned to British Columbia in the spring, has undertaken to procure, if possible, a perfect specimen, and to have it preserved in alcohol. Should he succeed, we may hope soon to have materials for the description of the species. Mr. Selwyn's specimen, though it has probably lost several inches of its length, being broken at both ends, is five feet one inch in length. It retains, attached to the granulated lower extremity, some traces of animal matter, in which I think I can detect, under the microscope, a few club-shaped spicules.

McGill College, Oct. 11 J. W. DAWSON

DR. HOOKER'S REPLY TO PROF. OWEN

THE Blue Book issued in August last, containing the correspondence between Dr. Hooker, Mr. Ayrton, and others respecting the management of and control over Kew Gardens, included also, in the form of an appendix, a statement addressed to Mr. Ayrton by Prof. Owen, containing various allegations detrimental to the present management of the gardens, herbarium, and museum. The following reply by Dr. Hooker to these allegations has just been printed by order of the House of Commons:—

"Prof. Owen divides the 'aims and applications' of the Royal Gardens of Kew, according to his view of them, under seven heads.

"It is sufficient to state that some of these are recognised by the Government, and specified in their instructions under which the Director carried out his duties; but that others, and those of a most comprehensive nature, have no place there, and are not such as pertain to botanical gardens elsewhere. Amongst these are the agricultural operations specified by Prof. Owen, 'the application of manures, demonstrations of the fittest species of grasses for particular soils . . . methods of irrigation, subterranean pipe, conveyed liquid manures, and so forth,' all of which are being carried out with vigour and success by various agricultural societies and private individuals throughout the country.

"To establish such operations at Kew would involve an enormous expenditure, and occupy many acres of ground now devoted to the legitimate purposes of a botanical garden.

"Illustrations of rock-works, garden sculpture, and ornamental waters, also recommended by Prof. Owen, appear to be equally out of place.

"Prof. Owen is in error in stating that the arrangement of plants in natural groups, with conspicuous labelling, &c., is at Kew 'at present limited to the herbaceous grounds;' as he is also in implying that there is no illustration of 'geographical distribution,' which is, in truth, carried out to an incomparably greater extent at Kew than in any other garden known to me at home or abroad. Prof. Owen cannot have visited the houses devoted to ferns, orchids, succulents, aroids, &c., nor the arboretum, fruiticetum, and pinetum, nor observed the arrangement on the shelves of the two great buildings, the palm stove and the temperate house.

"The fact that a first-rate herbarium and library must be maintained for the purposes of a botanical garden, and in immediate proximity to it, has not only been uniformly admitted and acted upon by successive Governments, but is so universally recognised by naturalists everywhere, that I am surprised that Prof. Owen should dispute it.

"I am sure that were he acquainted with the nature and amount of the duties devolving on this establishment, he would abandon his opinion without hesitation.

"In support of the contrary opinion he refers to that early period in the history of Kew, when its new and rare plants were named at the Banksian herbarium in London. But the naming of a few new and rare plants cultivated at the beginning of the century in a private garden of nine acres, probably at no one time containing more than 4,000 species, is a very different matter from keeping accurately named public collections that occupy 300 acres, and are estimated to contain 20,000 species; and this in an establishment that is annually called upon to name literally thousands of plants from other botanic gardens and nurseries in England and similar institutions abroad. A great deal of the naming, and keeping correctly named, the plants at Kew, can be conducted only by skilled botanists visiting the grounds daily. Large classes of plants are now cultivated that must be named in the houses where they grow; and many more, the tropical especially, could not be sent to a distance to be named, without serious damage *in transitu*.

"To this must be added the necessity of naming and ticketing with copious information the vegetable products of economic interest, in three museum buildings, the illustration of which products by specimens, Prof. Owen admits to be a legitimate object of the Gardens of Kew.

"Nor was the naming of the Kew plants carried out in London, as is supposed; there was a large herbarium in constant use at the Royal Gardens at the very period alluded to, the breaking up of which, when it was proposed to give up the Gardens, necessitated the formation of another.

"No comparison whatever can be instituted between the needs in these respects of the Royal Gardens at Kew and the Zoological Society's Gardens in the Regent's Park.

"The reflections that follow on the conduct of the late and present Directors of Kew Gardens are not suited for official discussion.

"Prof. Owen is in error in asserting that the main end or drift 'of Dr. Hooker's evidence before the Scientific Commissioners is to impress upon them the necessity of the transfer of the collection of dead plants' from the British Museum to Kew.

"My evidence is unequivocally opposed to such a transfer.

"Herbaria are not costly establishments, but the least expensive of all natural history collections; and the objects and applications of botany in its largest sense, are now so numerous and so important, as to render a division of the subject necessary; whence the expediency of

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